EXPLORING COMPETITIVE ANXIETY AND PERSONALITY IN EARLY SPECIALIZNG AND SAMPLING PEEWEE BOYS HOCKEY PLAYERS

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Abstract

Athletes who specialize early often invest more into their sport from a young age, thus it has been suggested early specializers may feel greater pressures to perform, and may have higher levels of anxiety. This study focused on better understanding competitive anxiety and personality, in relation to early specializers and non-early specializers. Hierarchal regression analyses revealed a significant relationship between CTA and CSA in Step 1. In Step 2, no significant additional variance was found for any of the predictor variables (i.e., OCEAN) or for the moderator variable (i.e., early specialization). In Step 3 no additional variance was accounted for by the interaction term for all predictor variables except agreeableness. The interaction of agreeableness and early specialization accounted for significant additional variance in CSA (ΔR^2 =. 035, p<. 05). Results highlight the need for future investigation into the role of personality and early specialization on CSA.

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Introduction

With the status and financial rewards earned by professional athletes, it is no wonder that many children and their parent's dream of reaching this level. However, this level is not easily attained, nor is there one 'right' way to get there. Many hold the belief that in order to reach elite status, children must start at a young age and focus on only one sport. This is the basic idea of early specialization; early start age, early involvement in one competitive sport, and focused high intensity training (Baker, Cobley & Fraser-Thomas, 2009)

The Developmental Model of Sport Participation (DMSP; Côté, 1999; Côté & -Thomas, 2016; Côté & Hay, 2002) suggests children may follow one of three unique sporting trajectories: (a) recreational sport through sampling, (b) elite sport through sampling, and (c) elite sport through early specialization. The third trajectory involving early specialization is becoming more popular among youth athletes (and their parents), who may believe this pathway is the only way to become the most elite in their sport (Feeley, Agel, & LaPrade, 2015). This belief is likely further accentuated by cases of well-known professional athletes such as Tiger Woods (golf) or the Williams sisters (tennis), who are the success stories of an early specialization pathway. However, extensive research over the past several decades has shown that early specialization is not the only way to attain elite status; and more recent research has shown early specialization may have negative consequences including increased rates of injury, dropout and burnout (Fraser-Thomas, Côté & Deakin, 2008; Gould, Tuffey, Udry, & Loehr, 1996; Law, Côté & Ericsson, 2007; Ruedi et al., 2014; Strachan, Côté & Deakin, 2009). For this reason it is important to study youth who choose to specialize early, particularly in comparison to those who choose not to specialize early.

The first objective of this study is to examine levels of competitive state anxiety among early specializers and samplers. Given that athletes who specialize early invest more into their sport from a young age than non-early specializers, it has been suggested early specializers may feel greater pressures to perform (Baker et al., 2009), and thus have higher levels of anxiety (Rainey & Cunningham, 1988). Competitive state anxiety is a form of anxiety that is often found among athletes; it is described as a response to a particular competitive situation, demonstrated by feelings of unease or nervousness (Martens, 1977). While somatic symptoms of competitive state anxiety (e.g., increased heart rate) are often perceived to be helpful for performance, cognitive symptoms (e.g., worry) may be perceived as being detrimental to performance (Aoyagi, Burke, Joyner, Hardy, & Hamstra, 2009).

The second objective of this study is to examine the personality traits of early specializers and samplers, as Vealey's (1990) Expanded Model of Competitive Anxiety proposes links between intrapersonal factors (i.e., competitive trait anxiety, personality traits) and state responses (i.e., competitive state anxiety). Specifically, competitive trait anxiety and the Big Five personality traits of each group will be examined in early specializers and samplers. Competitive trait anxiety is a personality disposition, which reflects a tendency to respond with anxiety in the anticipation of the threat of competition (Martens, 1977). Personality traits are patterns of behaviour, thoughts and feelings that distinguish one individual from another (Buss, 1989); they are relatively enduring and distinctive, and run on a continuum (Larsen & Buss, 2008). The most well established model of personality traits is the five-factor model of personality (McCrae & John, 1990), comprised of five distinct factors that are found in different levels in each individual: (a) openness to experience, (b) conscientiousness, (c) extraversion, (d) agreeableness, and (e) neuroticism (OCEAN).

Finally, the third objective of this study is to determine how personality traits (i.e., competitive trait anxiety, personality traits of OCEAN), and early specialization interact to predict competitive state anxiety. In addition to proposing links between intrapersonal factors and state responses, Vealey's (1990) Expanded Model of Competitive Anxiety also proposed links with situational factors, such as sport path or trajectory. Past research has shown associations between anxiety and neuroticism, extraversion, and conscientiousness (Gershuny & Sher, 1998; Griffith et al., 2010; Kotov, Gamez, Schmidt & Watson, 2010), as well as competitive trait and competitive state anxiety (Hanton, Mellalieu & Hall, 2001); however, no research to date has focused specifically on understanding interactions between children's early specialization pathways, their personality traits, and their levels of competitive state anxiety.

Recent growth in early specialization (Feeley, Agel, & LaPrade, 2015) is in contrast to the earlier work outlining the pathways of talented athletes (e.g., Côté, 1999; Côté & Hay, 2002) highlighting early sampling as the only/optimal pathway during childhood. As such, more research is needed to better understand anxiety levels and personality traits associated with the more recently proposed and followed pathway of early specialization (Côté & Fraser-Thomas, 2016). It is anticipated that findings may provide parents, coaches, and sport organizations with additional knowledge to inform their decisions, structures, and policies regarding youths' optimal trajectories within sport.

Literature Review

Youth Development

Adolescence (10-18 years) has historically been seen as a time of "storm and stress" (Hall, 1904). Placing a negative interpretation on this period of development led to the perspective that young people were problems to be solved (Damon, 2004). Within the field of

research focused on youth development, this led to the "deficit reduction approach" (Damon, 2004); meaning programs were designed to prevent problem behaviours in youth. Programs often targeted the circumstances in youths' lives that would produce problem behaviours, with the aim of changing these circumstances (Catalano, Hawkins, Berglund, Pollard, & Arthur, 2002). Communities began to develop prevention-based programs in the hopes of solving the problems among troubled youth (Wentworth, 1982). As time progressed however, researchers, practitioners, and programmers realized that focusing on decreasing or preventing problems alone was not sufficient to enhance positive developmental outcomes, and that something was missing from the field of youth development (Catalono et al., 2002). In 1991, Karen Pittman coined the phrase "problem free is not fully prepared," acknowledging the gap in the "deficit reduction approach."

Positive Youth Development

A new perspective on youth development began to emerge during the 1990s, termed positive youth development (PYD). PYD is an asset building approach that focuses on the potential of youth rather than merely the prevention of problems among youth (Damon, 2004). It was proposed that PYD based youth programs may expose young people to activities that allow them to build abilities and competencies, as well as exposing them to "horizon broadening experiences" (Roth & Brooks-Gunn, 2003). Lerner and colleagues (2005) proposed a framework outlining five key outcomes of participation in PYD based programs: the 5Cs of PYD. They suggested that if a program were built upon a framework of PYD, youth would gain the 5Cs: confidence, competence, connection, character and caring. Following the establishment of these optimal developmental outcomes, researchers began to explore which type of programs could foster PYD outcomes.

Positive Youth Development Through Sport

Many youth programs have applied and continue to apply the older "deficit reduction approach" to sport. For example, midnight basketball programs in high-risk neighborhoods offer troubled youth somewhere to be at night, with the goal of reducing problem behaviour. This type of sport-based intervention strategy comes with both benefits and pitfalls (Hartman, 2016). In some cases it is effective at reducing troubled behavior; however, in other cases, such programs simply allow all troubled youth to be in the same spot, and it has been suggested these programs may be easy targets for gangs and drug dealers (Hartman, 2016).

In recent years, an "asset building approach" has been applied in sport programs. Fraser-Thomas and colleagues (Fraser-Thomas, Côté & Deakin, 2005) postulated that organized sports could foster PYD outcomes (i.e., the 5Cs) in youth if programs make a conscious effort to maximize positive opportunities and experiences for the youth. Appropriate setting features, youths' stage of sport development, and involved adults have also been suggested to play an important role in creating positive experiences in order to facilitate PYD outcomes (Fraser-Thomas et al., 2005; Holt et al., 2017).

Organized Sport

According to parents, 75% of children participate in organized physical activity or sport (CFLRI, 2010). The definition of organized sport can often be unclear in research; therefore, for the purpose of this study, the Sport Canada (2010) definition of organized sport will be used. Sport Canada (2010) defines organized sport as an activity that involves two or more participants engaged for the purpose of competition. Sport involves formal rules and procedures, requires

tactics and strategies, specialized neuromuscular skills, and a high degree of difficulty and effort. Since organized sport is so prominent in childhood, a breadth of research has examined the benefits and determents of participation.

Developmental Model of Sport Participation

While a growing body of research suggests a clear association between participation in organized sport, and PYD outcomes (Holt et al., 2017) many concerns remain regarding the potential for negative outcomes through youths' sport participation – and particularly high performance youth sport (Fraser-Thomas et al., 2005; Law, Côté & Ericsson, 2007; Strachan, Côté & Deakin, 2009). Some have questioned whether the pursuit of an elite level of performance in sport is achieved at the cost of PYD (Fraser-Thomas et al., in-press; Fraser-Thomas & Strachan, 2015). In order to understand this debate, we must first take a step back and examine the different developmental pathways of sport participation.

The Developmental Model of Sport Participation (DMSP; Côté, 1999; Côté & Hay, 2002; Côté & Fraser-Thomas, 2016) is one of the most prominent conceptual frameworks in the literature (Bruner, Erikson, Wilson, & Côté, 2010). The original version of the DMSP (Côté, 1999; Côté & Hay 2002) suggested three primary stages of sport development leading towards high performance sport - sampling, specializing and investment. Within this model, in the sampling years, children (i.e., ages 6-12) are encouraged to try many different sports and to find enjoyment and excitement within sport. The goal of the sampling years is to learn basic motor skills and the fundamentals of sport. The second stage is the specializing stage (i.e., ages 13-15) where, after trying many sports, youth decide to focus on one or two sports. Sport specific skills emerge as an important component of this stage. The final stage in this trajectory involves investment (i.e., ages 16 onwards). In the investment stage, the athlete's goal becomes to attain

elite status in one particular sport. More time and resources are invested into the sport, and sport-specific skills become the central focus. However, if at any time an individual does not decide to pursue an elite level of sport, then they transition onto a recreational path of sport involvement. On the recreational path, the goal once again becomes enjoyment with the added goal of maintaining health and fitness, similar to the sampling years.

In more recent years, the DMSP has been revised to propose three distinct trajectories for athletes (Côté & Fraser-Thomas, 2016). The first is recreational participation through sampling. In this trajectory sampling leads into recreational participation with the goal of enjoyment remaining the same (Côté & -Thomas, 2016). The second trajectory is towards an elite level of performance through sampling. This trajectory is in line with the original model. Athletes progress from sampling to specializing to investment resulting in elite level performance (Côté & Fraser-Thomas, 2016). Many athletes may choose to remain on one particular pathway for the duration of their sport experience while others may choose to transfer to a different pathway if they are no longer satisfied. In the most recent version of the DMSP, the most significant adaption is the addition of the early specialization pathway.

Early Sampling Versus Early Specialization

It could be argued that the third trajectory of early specialization was added to the DMSP (Côté & Fraser-Thomas, 2016) to reflect the trajectory that appears to be increasingly popular within youth sport in Western nations (Feeley, Agel, & LaPrade, 2016; Jayanthi, Pinkham, Dugas, Patrick, & LaBella, 2010); early specialization is also the pathway that garners the most discussion and debate. The early specialization path involves athletes skipping the sampling stage and beginning with sport specialization, with the sole purpose of achieving an elite level of performance (Côté & Fraser-Thomas, 2016). Wiersma (2000) proposed early specialization is

when children limit participation to a single sport on a year-round basis, with a deliberate focus on training and development in that sport. Baker, Cobley and Fraser-Thomas (2009) expanded the definition of early specialization to include "early start age in sport, early involvement in one sport, early involvement in high intensity training, and early involvement in competitive sport" (p.77-78).

Given the controversy surrounding early specialization, this study will focus on the childhood years (i.e., before age 13) – comparing the sampling path towards high performance, and the early specialization path towards high performance. The argument in favor of early specialization can be quite compelling. Besides the famous cases of Tiger Woods and the Williams sisters whose paths of early specialization led to the highest rankings in professional sport, the age-old expression of "practice makes perfect" is the foundation of the early specialization argument, and research has supported the claim (Ericsson Krampe, & Tesch-Römer, 1993; Simon & Chase 1988). Specifically, Ericsson and colleagues argued that a deliberate form of practice (i.e., "deliberate practice") specifically designed to increase the level of performance (and thus not always inherently enjoyable), is key to acquiring an elite level of performance. As such, these researchers indicate that in addition to quantity, quality of practice is important to foster elite performance. Another key underpinning of the theory of deliberate practice is that a monotonic relationship exists between deliberate practice and the level of performance attained, providing further rationale for early specialization. In theory, the more time spent in deliberate practice, the higher the attained level of performance. Furthermore, Ericsson and colleagues (1993) found that the amount of hours of deliberate practice for great violinists was over 10,000 hours, whereas good violinists only partook in deliberate practice for a total of less than 7,000 hours. With this theory in mind, the rationale for early specialization was

strengthened; the sooner an athlete starts deliberate practice in one particular sport, the sooner they would reach 10,000 hours of deliberate practice, and subsequently an elite level of performance.

However, there is evidence suggesting early specialization is not always required to attain an elite level of performance. In his seminal work in six distinct disciplines (i.e., concert pianists, sculptors, Olympic swimmers, Olympic tennis players, mathematicians and neurologists,), Bloom (1985) found talented individuals consistently engaged in diverse activities during their childhood. Essentially, they found that the majority of experts, regardless of discipline, followed a path that was in line with the DMSP's (Côté & Fraser-Thomas, 2016) elite level through sampling. Within sport specific contexts, Côté's (1999) seminal study, which led to the original DMSP, found elite level rowers and tennis players, had sampled several sports at an early age. Later, Baker, Côté, and Deakin (2005) found that elite level triathletes had also sampled many different sports at a young age, with some specializing as late as 20 years of age. Further, in a study of 4 NHL drafted hockey players a similar pattern was found. Athletes had engaged in more hours of deliberate play (i.e., activities that are intrinsically motivating, designed to maximize fun/enjoyment and provide immediate gratification; Côté, 1999; Côté & Hay, 2002) than deliberate practice from the ages 6 to 20, with the majority of deliberate play hours taking place during the sampling years and the majority of deliberate practice hours taking place after 16 years of age (Soberlack & Côté, 2003). Collectively, these studies suggest early specialization is not a requirement for elite performance.

There is also growing evidence that early specialization can be detrimental to the physiological health of youth. In a retrospective study of elite rhythmic gymnasts, researchers found those who had reported patterns of early specialization also reported lower overall health

(Law, Côté & Ericsson, 2007), indicating potential negative consequences of early specialization. More recent research has suggested athletes who followed a pattern of early specialization are more likely to report an injury than those who do not (Jayanthi, Pinkham, Dugas, Patrick, & LaBella, 2012), with one case control study of youth finding that over a three-year period, athletes who were early specializers were at an increased risk of injury (Ruedi et al., 2014). Proponents to the early sampling approach present additional arguments in favor of sampling, suggesting that youth engagement in a diversity of sports with similar cognitive and physical demands may be as favorable as the sport specific training, given they may receive the same benefits of early specialization without the repetitive stress on the same muscle groups (Baker, Cobley & Fraser-Thomas, 2009).

On top of the physiological consequences, there has also been evidence of negative psychosocial outcomes due to early specialization. Patterns of early specialization have been linked to dropout and burnout from sports, as well as increased levels of emotional exhaustion (Fraser-Thomas, Côté & Deakin, 2008; Gould, Tuffey, Udry, & Loehr, 1996; Strachan, Côté & Deakin, 2009). In contrast, samplers have reported greater connections to the community and greater integration of sport and family (Strachan, Côté & Deakin, 2009).

Overall, it appears that children are following two distinct trajectories to high performance sport (i.e., elite performance through sampling, and elite performance through early specialization); however there is inconclusive evidence to determine that one of these pathways more consistently facilitates elite performance and healthy developmental outcomes (i.e., physical, psychosocial, long term participation). With such an array of possible consequences to early specialization and sampling, it is important to continue to advance understanding more about the youth following these two pathways, and potential outcomes of these trajectories.

Anxiety

One factor that is worthy of further study among early specializers and samplers is anxiety, given that anxiety is a mental disorder of growing concern. As the most common mental illness in Canada, the lifetime prevalence of anxiety is 25%, meaning approximately 7.5 million Canadians will be diagnosed with at least one anxiety disorder in their lifetime (Anxiety Disorders Association of Canada, 2007). While athletes may commonly be viewed as 'mentally tough', they are not immune to anxiety disorders. A study of Australian elite athletes found 26.3% suffered from some form of anxiety disorder (Gulliver et al., 2014). There is evidence however, indicating sport may be a protective factor against anxiety disorders. A study of German athletes found that current elite athletes had lower levels of anxiety compared to de-select and non-athletes (Brand, Wolff & Hoyer, 2012). Another recent study in a small sample of Canadian high performance athletes (i.e., national teams) with diagnosed mood disorders found that training sessions seemed to serve as a means of managing anxiety levels (Dickler & Fraser-Thomas, 2016).

Key tenets of anxiety disorders are feelings of uneasiness, nervousness or worry that manifest through both cognitive and somatic (physical) symptoms (American Psychiatric Association, 2013). The somatic symptoms of someone who is experiencing anxiety include increased heart rate or heart palpitations, shortness of breath, and increased sweating. The cognitive symptoms of anxiety include lack of concentration, repetitive negative thoughts, and disruptions in memory (American Psychiatric Association, 2013). In some situations, anxiety is adaptive, allowing one to be more alert or focused on challenging or threatening circumstances (American Psychiatric Association, 2013). In excess however, anxiety can be debilitating,

making it difficult for one to perform day-to-day tasks (Anxiety Disorders Association of Canada, 2007). There are two different forms of anxiety. State anxiety refers to one's anxiety level at a particular moment in time or in a particular situation, while trait anxiety is the tendency to experience anxiety often and reflects how anxious an individual is, in general (Spielberger, 1972).

Competitive Anxiety

Competitive anxiety is a form of anxiety commonly found in sports, which can take either state or trait forms. Competitive *state* anxiety is a feeling of unease or nervousness in anticipation of a competitive event, while competitive *trait* anxiety is a tendency to respond with anxiety in the anticipation of the threat of competition (Martens, 1977). Vealey's (1990) Expanded Model of Competitive Anxiety offers a solid framework for better understanding competitive anxiety in young athletes. The framework integrates elements of Martens' (1977) original competitive anxiety model and Martens' (1975) model of the competitive process. Trait anxiety is central to the model, as evidenced with intrapersonal factors (such as trait anxiety) located at the core of the model. Four key links are outlined in relation to intrapersonal factors. First, it is suggested that situational factors in an objective competitive situation can interact with intrapersonal factors (such as trait anxiety) to create a perception of threat, which is part of the subjective competitive situation. Second, this perception of threat can then further interact with intrapersonal factors to influence the individual's state responses (particularly state anxiety) as well as performance. Third, cognitive, somatic and behavioral responses can then interact with intrapersonal factors to create different performance outcomes, or consequences**.** Finally, the cycle of the model is completed as the reciprocal influence of performance influences intrapersonal factors. This model loosely guided the present study, with a focus on links between

situational factors (i.e., early specialization), intrapersonal factors (i.e., competitive trait anxiety and other personality traits), and state responses (i.e., competitive state anxiety).

Extensive research has examined competitive state and trait anxiety in the literature, with a particular focus on types of sport, age/stage of development, and performance outcomes. Specifically, athletes competing in individual sports have reported higher levels of competitive state anxiety than those competing in team sports (Flowers & Brown, 2002). Further, in a sample of 153 athletes at three developmental stages (early adolescence, high school, college), somatic symptoms of competitive state anxiety were perceived to be helpful for performance whereas cognitive symptoms were perceived as being detrimental to performance (Aoyagi, Burke, Joyner, Hardy, & Hamstra, 2009). Competitive state anxiety has been understandably linked to competitive trait anxiety. Athletes higher in competitive trait anxiety respond to competition with greater levels of competitive state anxiety compared to those with low competitive trait anxiety; this has been found in terms of both cognitive and somatic symptoms of anxiety (Hanton, Mellalieu & Hall, 2001). Of particular concern are potential negative outcomes associated with high competitive trait anxiety. For example, higher levels of competitive trait anxiety have been associated with more athlete worry about not playing well, making mistakes, and losing (Rainey & Cunningham, 1988). Additionally and of more concern is that Aoyagi and colleagues' (2009), study found a strong positive correlation between competitive trait anxiety and burnout.

Personality

Personality is an additional variable of interest when considering athletes' anxiety. A meta-analysis of clinical disorders such as anxiety and personality, found that those diagnosed with a clinical mental disorder were consistently higher in neuroticism and lower in conscientiousness compared to the general population (Malouff, Thorstiensson & Schutte, 2004).

A similar result was found in a second meta-analysis, where high neuroticism was the strongest correlate of common mental disorders (Kotov, Gamez, Schmidt, & Watson, 2010). These meta-analyses indicate a connection between a distinct personality trait (i.e., high neuroticism) and mental disorders. In order to better understand this connection, one must first have a better understanding of personality traits.

Personality traits are often considered characteristics that people posses, and have been described as how people are the same or different (Larsen & Buss, 2008). Traits are relatively enduring and distinctive, and run on a continuum, therefore everyone possess the same traits but to varying degrees (Larsen & Buss, 2008). Research into personality traits has proposed several theories as to the number of individuals' traits. Eysenck (1967) suggested there might be as few as two personality traits (i.e. extraversion and neuroticism), while Catell and Kline (1977) suggested as many as 16 traits. The most widely employed model of personality is the five-factor model (FFM). Proposed by McCrae and John (1990), the FFM was created using a combination of language (lexical hypothesis) and statistics. First, researchers examined the words used in the past to measure personality, and then the words were grouped into categories. Five separate categories were initially proposed, with a factor analysis confirming the presence of the five factors; these were subsequently labeled neuroticism, extraversion, agreeableness, conscientiousness, and openness to experience. Neuroticism is the most agreed upon factor; it encompasses low emotional stability, moodiness and insecurity. Extraversion is a well-recognized category; one who is high in extraversion is talkative, social, and assertive. Agreeableness is difficult to ascertain from its name; someone high in agreeableness would be described as sincere, warm, understanding and sympathetic. Another factor that is difficult to ascertain from its name is openness to experience. This factor encompasses qualities such as

creativity, intellect and imagination. Finally, conscientiousness describes one who is organized, prompt, and practical. The variation of these five factors in every individual comprises one's personality.

Personality in Sport

Research into the relationship between personality and different aspects of sport has yielded interesting results. In a study of 400 young adult athletes of varying skill levels, researchers found that all athletes had higher levels of extraversion compared to the general population (Kirkclady, 1982). Further evidence of this distinction was found in a study of athletes (i.e., triathletes and long distance runners) who were found to be more extraverted when compared to non-athletes (Eglof & Gruhn, 1995). Additionally, more dedicated athletes (i.e., training or competing 11 hours/week) were also more extraverted than less dedicated athletes (i.e., training or competing 4 hours/week) (Eglof & Gruhn, 1995). A similar study showed athletes not only varied in terms of extraversion (higher than average scores), but there was a significant difference between athletes and a control group in terms of neuroticism (Mckelvie, Lemieux & Stout, 2003). University athletes had significantly lower scores of neuroticism compared to a normative university sample (Mckelvie et al., 2003). Moreover Kajtina, Tušak, Barić, and Burnik, (2004) found complementary results in their comparison of athletes to non-athletes, with athletes being lower in neuroticism as well as higher in conscientiousness.

Low levels of neuroticism not only distinguish those who play sports from those who do not, but can also separate performance and competition levels among athletes (Allen, Greenless &, Jones 2011; Piedmont, Hill, & Blanco, 1999). In one study among female college soccer players (Piedmont et al., 1999), higher-level athletes were found to be lower in neuroticism and higher in conscientiousness than lower levels athletes. Furthermore lower scores of neuroticism and higher

scores of conscientiousness were significantly related to higher performance. Given the research showing distinctions in the personalities of athletes and non-athletes, as well as higher and lower performing athletes, there may also be value in trying to better understand if differences exist between early samplers and early specializers, in terms of the five factors of personality.

Rationale and Purpose

Recent growth in early specialization (Feeley, Agel, & LaPrade, 2015) is in contrast to the earlier work suggesting talented athletes typically sample different sports during childhood (e.g., Côté, 1999; Côté & Hay, 2002). Athletes who specialize early often invest more into their sport from a young age than non-early specializers, thus it has been suggested early specializers may feel greater pressures to perform (Baker et al., 2009), and may have higher levels of anxiety (Rainey & Cunningham, 1988). This study focuses on better understanding competitive anxiety and personality, in relation to early specializers and non-early specializers.

Vealey's (1990) Expanded Model of Competitive Anxiety proposes links between situational factors (e.g., early specialization), intrapersonal factors (i.e., personality traits), and state responses (i.e., competitive state anxiety). Past research has shown associations between anxiety and the personality traits of neuroticism, extraversion, and conscientiousness (Gershuny & Sher, 1998; Griffith et al., 2010; Kotov, Gamez, Schmidt & Watson, 2010). Past research also highlights associations between competitive trait and competitive state anxiety (Hanton, Mellalieu & Hall, 2001). However, no research to date has focused specifically on understanding interactions between children's early specialization pathways, their personality traits, and their levels of competitive state anxiety.

This study has three primary objectives: (a) to examine levels of competitive state anxiety among early specializers and samplers, (b) to examine levels of personality traits (i.e.,

competitive trait anxiety and OCEAN - openness, conscientiousness, extroversion, agreeableness, neuroticism; McCrae & John, 1990) of early specializers and samplers, c) to determine how personality traits (i.e., as outlined above) and early specialization interact to predict competitive state anxiety. It is anticipated that findings may provide parents, coaches, and sport organizations with additional knowledge to inform their decisions, structures, and policies regarding youths' optimal trajectories within sport.

MANUSCRIPT

Summary

Athletes who specialize early often invest more into their sport from a young age, thus it has been suggested early specializers may feel greater pressures to perform, and may have higher levels of anxiety. This study focused on better understanding competitive anxiety and personality, in relation to early specializers and non-early specializers. Hierarchal regression analyses revealed a significant relationship between CTA and CSA in Step 1. In Step 2, no significant additional variance was found for any of the predictor variables (i.e., OCEAN) or for the moderator variable (i.e., early specialization). In Step 3 no additional variance was accounted for by the interaction term for all predictor variables except agreeableness. The interaction of agreeableness and early specialization accounted for significant additional variance in CSA (ΔR^2 =. 035, p<. 05). Results highlight the need for future investigation into the role of personality and early specialization on CSA.

Exploring Competitive Anxiety and Personality in Early Specializing and Sampling Pewee Boys Hockey Players

In recent years there has been a growing trend in western nations for young people participating in youth sport to follow a path of early sport specialization (Feeley, Agel, & LaPrade, 2016; Jayanthi, Pinkham, Dugas, Patrick, & LaBella, 2010). Early specialization has been described as children limiting participation to a single sport on a year-round basis, with a deliberate focus on training and development in that sport (Wiersma, 2000). The arguments in favor of early specialization can be quite compelling. Aside from the famous cases of Tiger Woods and the Williams sisters whose paths of early specialization led to the highest rankings in professional sport, the age-old expression of "practice makes perfect" is the foundation of early specialization, and research has supported this claim (Ericsson Krampe, & Tesch- Römer, 1993; Simon & Chase 1988). Accompanying the increase in children following a path of early sport specialization, has been a growing body of research focused on potential positive and negative outcomes of the early specialization pathway (Baker, Cobley & Fraser-Thomas, 2009; Fraser-Thomas, Côté & Deakin, 2008; Gould, Tuffey, Udry, & Loehr, 1996; Law, Côté & Ericsson, 2007;Strachan, Côté & Deakin, 2009); however, two key psychological constructs – personality and anxiety - have been largely overlooked in these examinations. Personality traits are considered a person's characteristics, and are most often measured according to the five-factor model of neuroticism, extraversion, agreeableness, conscientiousness, and openness to experience (McCrae & John, 1990); everyone has these traits, but the varying degrees of these traits across people are what make people the same or different (Larsen & Buss, 2008). Competitive state and trait anxiety have been studied extensively in sport contexts (Aoyagi, Burke, Joyner, Hardy, &

Hamstra, 2009; Flowers & Brown, 2002; Hanton, Mellalieu & Hall, 2001; Rainey & Cunningham, 1988), but have not yet been examined specifically in relation to sport developmental trajectories (i.e., early specialization). The purpose of this study was to examine the relationship between early specialization, personality traits, and competitive anxiety.

Early Specialization

As noted above, Wiersma (2000) first defined early specialization as children limiting participation to a single sport on a year-round basis, with a deliberate focus on training and development in that sport. Baker and colleagues (2009) expanded the definition of early specialization to include "early start age in sport, early involvement in one sport, early involvement in high intensity training, and early involvement in competitive sport" (p.77-78). Considerable research over the past two decades has focused on the potential benefits and negative outcomes associated with early specialization, with much of this research guided by the Developmental Model of Sport Participation (DMSP; Côté, 1999; Côté & Fraser-Thomas, 2016; Côté & Hay, 2002) The DMSP is an empirically-based model that proposes three separate trajectories that athletes follow. The first proposed path is recreational participation though sampling. Athletes who follow this path play many different sports as a child and continue to play diverse sports with the sole purpose of fitness and enjoyment. The second pathway is elite performance through sampling; in this pathway athletes begin playing many sports as a child but progress to specialize and investment in one sport with age, often with the aim of reaching elite levels in that sport. The final proposed pathway is elite performance through early specialization which differs from the pervious two as it involves bypassing the sampling stage (i.e., not trying many sports as a child) and beginning with sport specialization during childhood, often with the aim of achieving an elite level of performance (Côté & Fraser-Thomas, 2016). The focus of this

study will be the later two pathways (i.e. elite performance through sampling and early specialization).

Research guided by the DMSP (Côté & Fraser-Thomas, 2016) has highlighted probable positive and negative outcomes of early specialization as a path to high performance sport (Fraser-Thomas et al., 2005; Law, Côté & Ericsson, 2007; Strachan, Côté & Deakin, 2009). Suggested benefits of early specialization draw upon Ericsson and colleagues' (1993) theory of deliberate practice. The underpinning of the theory is that a monotonic relationship exists between deliberate practice and the level of performance attained; thus, the more time spent in deliberate practice, the higher the attained level of performance (Ericsson et al., 1993). However, there is also evidence suggesting the early sampling path of the DMSP may also lead to an elite level of performance. Bloom's (1985) seminal study of talented performers found athletes consistently engaged in diverse activities during their childhood. More recent research has shown elite level rowers, tennis players, and triathletes sampled several sports at an early age with some triathletes not specializing until as late as 20 years of age (Baker, Côté, & Deakin, 2005; Côté, 1999). Further, there is also growing concern, that early specialization can be detrimental to the physiological and psychosocial health of youth. Early specializers experience higher rate and risk of injury as well as higher levels of emotional exhaustion, dropout and burnout (Fraser-Thomas, Côté & Deakin, 2008; Gould, Tuffey, Udry, & Loehr, 1996; Jayanthi, Pinkham, Dugas, Patrick, & LaBella, 2012; Strachan, Côté & Deakin, 2009). With such an array of possible consequences associated with the early specialization and diversification pathways, it is important to continue to advance understanding of the experiences of youth following these two pathways, and potential outcomes of these trajectories.

Personality

While personality traits have been examined extensively among athletes (Allen, Greenless &, Jones 2011; Eglof & Gruhn, 1995; Kirkclady, 1982; Mckelvie et al., 2003; Piedmont, Hill, & Blanco, 1999) no research to date has focused specifically on personality traits in relation to children and youths' sport trajectories. Personality traits are often considered characteristics that people possess, and have been described as how people are the same or different (Larsen & Buss, 2008). The five factor model of personality suggests that there are five personality traits that everyone posses to varying degrees (McCrae & John, 1990): neuroticism, extraversion, agreeableness, conscientiousness, and openness to experience (OCEAN). The variation of these five factors in every individual comprises one's personality.

Research into the relationship between personality and different aspects of sport has yielded interesting results. Studies have found that athletes have higher levels of extraversion compared to the general population (Eglof & Gruhn, 1995; Kirkclady, 1982), as well as significantly lower scores of neuroticism and higher scores of conscientiousness (Kajtina, Tušak, Barić, and Burnik, 2004; Mckelvie et al., 2003). Furthermore, this combination of personality traits (higher conscientiousness and lower neuroticism) has also distinguished higher performing and more dedicated athletes from lower level less dedicated athletes (Allen, Greenless &, Jones 2011; Piedmont, Hill, & Blanco, 1999). Given past research suggesting relationships between personality and sport and athletic outcomes, it is important to also understand how these relationships may play out among younger children, specifically in relation to sport trajectory pathways.

Anxiety in Sport

Another key variable that has been largely studied in sport contexts (Aoyagi, Burke, Joyner, Hardy, & Hamstra, 2009; Flowers & Brown, 2002; Hanton, Mellalieu & Hall, 2001;

Rainey & Cunningham, 1988), but has yet to be examined in relationship to children's sport trajectories is anxiety. Competitive anxiety is a form of anxiety commonly found in sports. Competitive *state* anxiety (CSA) is a feeling of unease or nervousness in anticipation of a competitive event, while competitive *trait* anxiety (CTA) is a tendency to respond with anxiety in the anticipation of the threat of competition (Martens, 1977).

Extensive research has examined competitive state and trait anxiety in the literature, with a particular focus on types of sport, age/stage of development, and performance outcomes. Specifically, athletes competing in individual sports have reported higher levels of CSA than those competing in team sports (Flowers & Brown, 2002). CSA has been understandably linked to CTA. Athletes higher in CTA respond to competition with greater levels of CSA compared to those with low CTA; this has been found in terms of both cognitive and somatic symptoms of anxiety (Hanton, Mellalieu & Hall, 2001). Of particular concern are potential negative outcomes associated with high competitive anxiety. For example, higher levels of CTA have been associated with more athlete worry about not playing well, making mistakes, and losing (Rainey & Cunningham, 1988), and a strong positive correlation has been found between CTA and negative sport development outcomes such as burnout (Aoyagi et al., 2009).

Of particular interest for this particular study, is evidence indicating a relationship between anxiety and personality. A meta-analysis of clinical disorders found that those diagnosed with an anxiety disorder were consistently higher in neuroticism and lower in conscientiousness compared to the general population (Malouff, Thorstiensson & Schutte, 2004). A similar result was found in a second meta-analysis, where high neuroticism was the strongest correlate of common mental disorders (i.e., anxiety disorders) (Kotov, Gamez, Schmidt, & Watson, 2010). Thus, these meta- analyses indicate a connection between a distinct personality trait (i.e., high

neuroticism) and anxiety.

Rationale and Purpose

Currently, there is a growing trend towards early specialization within youth sport programs, yet varied positive and negative outcomes have been associated with the early specialization trajectory (Baker, et al., 2009 ; Law, et al., 2007; Strachan et al., 2009). It has been suggested that early specialization could lead to higher levels of competitive anxiety, given athletes invest more time and may feel greater pressure to succeed (Baker et al., 2009), and past research has shown competitive anxiety and personality are important factors influencing sport outcomes (Eglof & Gruhn, 1995; Piedmont et al., 1999; Rainey & Cunningham, 1988); however, little research has examined personality traits in young athletes. As such, this study aimed to advance understanding of optimal developmental pathways for young people, through examination of relationships between sport trajectory, personality, and anxiety.

To fully explore the potential relationship between sport trajectory, personality, and anxiety, we first examined the relationship of sport trajectory with personality and anxiety independently. As such, our first two objectives were (a) to examine competitive anxiety (trait and state) among early specializers and samplers, and determine if significant differences exist between groups, and (b) to examine personality traits among early specializers and samplers, and determine if significant differences exist between groups. Because of the strong established links between personality and anxiety (Griffith et al., 2010; Kotov, Gamez, Schmidt & Watson, 2010) we also wanted to better understand the relationship between all three variables, thus the final objective was, (c) to examine the relationship of personality traits on competitive anxiety, moderated by early specialization.

Methods

Participants

Participants included 77 male peewee hockey players (i.e., ages 11-12; no body checking) from seven different teams in Toronto, Canada's largest city. Only males were included in the study due to key differences in the likelihood of reaching the professional level (i.e. male only National Hockey League) that often leads to an earlier focus on performance for males compared to females. Players competed at the three highest levels of hockey (i.e., 51.9% played at the A level, 29.9% played at the AA level, and 18.2% played at the highest AAA level). The majority of the sample was Caucasian (81%), having a mean start age of 5.33 years old (SD = 1.40). The researcher contacted 20 teams to be a part of the study, with coaches of seven teams agreeing for their team members to be approached to participate. Of the potential 119 athletes on these seven teams, 71% of athletes participated and fully completed the study.

Data Collection Procedure

After receiving institutional ethics approval, data was collected from parents and players towards the end of the hockey season (i.e., January and February, 2017). First, coaches were contacted and asked whether they would be interested in having their teams participate in a study exploring competitive anxiety, personality and hockey pathways. Upon coaches' agreement, the researcher arranged to attend a game to approach players and parents regarding participation. Prior to the game, parents were provided information, and consent/assent forms for themselves and their child. Upon receipt of parental consent, youth were asked to provide assent if they were interested in participating. Parents were then asked to complete a survey at their convenience (i.e., before, during, or after the game) that included demographic information and served to determine whether or not their child was following an early specialization pathway. Prior to the game, players completed a context-specific survey to measure competitive state anxiety. After the game (or at the next subsequent practice if time did not permit after the game), players completed

two additional (non-context specific) surveys to measure personality and competitive trait anxiety. All tools are described below.

Measurement Tools

Demographic Information and Sport Trajectory. Parents completed a survey modified from the Developmental History of Athletes Questionnaire (DHAQ; Hopwood, Baker, MacMahon & Farrow, 2010), which collected demographic information and was used to determine hockey players' sport trajectory (i.e., early specializer or sampler). Demographic information included child's birth year, family information, ethnicity, team name, start age in hockey, and current level of hockey. Extensive information regarding time involvement in hockey and other non-hockey organized activities over the past 5 years was also collected to determine sport trajectory. Specifically, for each "in season" (i.e., September to March) or "off season" (i.e., April to August) hockey period parents were asked to list all the types of organized hockey activities their child participated in and the average total number of hours per week that their child participated in these organized hockey activities. Parents were then asked to list all other (non-hockey) organized sport activities their child was involved in, the number of months their child was involved in each other organized sport, and the average number of hours per week that their child was involved in each organized sport.

Based on the definition suggested by Baker and colleagues (2009), a participant was deemed an early specializer if they only participated in hockey for the duration of the hockey season (i.e., seven months) and spent a greater amount of time in ice hockey than in other sports over the two past years (i.e., from August 2015 - March 2017). In contrast, an athlete was deemed a sampler if they participated in a least one sport other than hockey and spent an equal or greater amount of time in other sports in comparison to hockey over the past two years. As ice hockey

programming in Canada generally promotes an early entry into the sport for all players, the two groups were not distinguished based on start age in sport.

Competitive State Anxiety. The Competitive State Anxiety Iventory-2 Children's form (CSAI-2C; Stadulis, MacCracken, Eidson, & Severance, 2002), a child comprehendible version of the Competitive State Anxiety Iventory-2 (CSAI-2; Martens, Burton, Vealey, Bump, & Smith, 1990) was used to measure competitive state anxiety. CSA is often found among athletes in response to a particular competitive situation, demonstrated by feelings of unease or nervousness (Martens, 1977). The CSAI-2C is a 15-item scale that measures three specific components (cognitive anxiety, somatic anxiety, and self-confidence) of competitive state anxiety. Each subscale contains five items that are assessed on a 4-point scale from 1 ("not at all") to 4 ("very much"). The CSAI-2C has been found to be psychometrically sound, with strong reliability, validity, and the same original three-factor structure found as the original CSAI-2 (Stadulis et al., 2002).

Competitive Trait Anxiety. The Sport Anxiety Scale-2 (SAS- 2; Smith, Smoll, Cumming, & Grossbard, 2006) was used to measure competitive trait anxiety. Competitive trait anxiety is defined as a tendency to feel apprehension and tension as a result of the perceived threat of competitive situations (Martens, 1977). The SAS-2 measures both somatic (physical) and cognitive (mental) trait anxiety in competitive settings. The SAS-2 is a 15-item measure that contains three subscales (i.e., somatic anxiety, worry, concentration disruption), each containing five related items. The items are scored on a scale from 1 ("not at all") to 4 ("very much"). The SAS-2 is preferable to the original Sport Anxiety Scale (SAS; Smith, Smoll & Schutz, 1990) because it has been shown to be valid in younger populations compared to the SAS (Smith et al., 2006). The SAS-2 has shown strong construct validity and reliability in the desired population

(Smith et al., 2006). Additionally, in a multicultural sample of children ages 7 to 18, the SAS-2 showed little invariance in age, sex, or type of sport (Laloux, Viladrich, Sousa, & Jannes, 2015).

Personality. Personality was measured using the Mini International Personality Item Pool scale (Mini IPIP; Donnellan, Oswald, Baird & Lucas, 2006). The Mini IPIP was created from the International Personality Item Pool (Goldberg, 1999) and contains 20 items, with four items for each of the five assessed traits: (a) *Extraversion,* which manifests in behaviours such as being talkative, social, and assertive; (b) *Agreeableness,* which manifests in behaviours such as being sympathetic, kind, warm and sincere; (c) *Conscientiousness,* which manifests in behaviours such as being organized, practical, and prompt; (d) *Openness to Experience,* which manifests in behaviours such as being intellectual, imaginative and creative*;* and (e) *Neuroticism,* which manifests in characteristic such as having low emotional stability being moody and insecure.

The Mini IPIP (Donnellan et al., 2006) was used due to the age of participants (i.e., 11-12 years), as it was impractical to expect young children to fill out an exceptionally long questionnaire such as the 240 item "NEO Personality Inventory- Revised" (Costa & McCrae, 1990) or the "100 Markers of the Big Five" (Goldberg, 1992). Concerns around using a shorter questionnaire center around whether the statistical robustness of the measure decreases with the length; however, shorter personality inventories have maintained criterion validity and shown strong predictive ability when compared to longer inventories (Thalmayer, Saucier & Eigenhuis, 2011). Donnellan et al. (2006) validated the Mini IPIP showing acceptable internal consistencies and high test-retest reliability. Furthermore, an exploratory factor analysis of the Mini IPIP indicated the presence of five factors, adding additional support to the structure of the tool (Cooper, Smillie & Corr, 2010).

Analyses

Data analyses were performed using SPSS 24.0. Total scores were calculated for each subscale of personality (i.e., OCEAN) and for each subscale of CSA (i.e., cognitive anxiety, somatic anxiety, confidence) and CTA (i.e., somatic anxiety, worry, concentration). Similarly, overall scores were calculated for both CTA and CSA by summing each of the above mentioned subscales. A higher score was indicative of higher levels of CSA or CTA.

First, correlations were conducted on all variables to assess the initial strength of relationships. Then, to address the study's first two objectives, independent sample t-tests were conducted on subscales as well as overall scores to (a) determine if there was a significant difference in anxiety (both competitive trait and state) between early specializers and samplers, and (b) determine if there was a significant difference in personality traits between early specializers and samplers. Finally, moderated hierarchical multiple regression analyses were used to better understand the relationship between personality, anxiety, and early specialization; specifically, regressions examined relationships among predictor (i.e., five personality factors of OCEAN), moderating (early specializer versus sampler), and the outcome variable (overall CSA).

Results

Descriptive statistics are provided in Table 1. Based on the previously outlined criteria, 43 of 77 (55.8%) participants were classified as early specializers. Pearson correlation coefficients are presented in Table 2. Among the predictor and outcome variables there were several significant correlations, but they were all relatively small (i.e., $r < .24$). While the significant correlation between CSA and CTA was moderately high ($r = .656$, $p < .001$), this was not unexpected (e.g., Hanton, Mellalieu & Hall, 2001). In order to account for the possibility of multicollinearity, CTA was controlled for in multiple regression analyses as a covariate rather

than a predictor variable. While there were several additional significant correlations between predictor variables, correlations were low (i.e., $r < .35$) and therefore were not concerning with regards to multicollinearity.

To address the study's first two objectives, independent sample t-tests were conducted to (a) determine if there was a significant difference in anxiety (both competitive trait and state) between early specializers and samplers, and (b) determine if there was a significant difference in personality traits (i.e., OCEAN) between early specializers and samplers. There was no significant difference in overall scores on CSA for early specializers ($M = 23.90$, $SD = 6.77$) and samplers ($M = 24.33$, $SD = 5.70$); $t(72) = .29$, ns. Further examination of potential differences in each subscale of CSA yielded no significant results for somatic anxiety; $t(73) = -.34$, ns, cognitive anxiety; $t(74) = -.01$, ns, or self-confidence; $t(75) = 1.51$, ns. Similarly there was no significant difference between early specializers ($M = 23.32$, $SD = 7.31$) and samplers ($M = 21.64$, $SD = 4.35$,) in overall scores of CTA; $t(72) = -1.16$ or the subscales of somatic anxiety; $t(72) = -1.11$, ns, worry; $t(72) = -.89$, ns, or concentration; $t(72) = -.98$, ns. Further, results of independent t-tests comparing the five personality traits (i.e., OCEAN) yielded no significant results, meaning early specializers and samplers did not differ significantly in any of these personality traits.

To fully explore the relationship between all three variables (i.e., personality, early specialization, competitive anxiety), five separate hierarchal regressions were conducted for each one of the five personality factors. In Step 1, potential covariates were added based on previous literature (i.e., CTA and level of hockey), in order to assess how much variance the predictor variables accounted for above and beyond the controls. In Step 2, the predictor variables were added (e.g., personality factor such as conscientiousness and early specializer/sampler) and in Step 3, the interaction variable (e.g., personality factor such as conscientiousness by early

specialization) was added to examine a potential moderation effect of early specialization. The interaction term was created as suggested by Aiken and West (1991), which involved centering the predictor variables and then multiplying the residuals by early specialization. This method is recommended to avoid high multicolliniarity between the predictor and interaction variables (Aiken & West, 1991). Results of each regression analysis are presented in Table 3, Table 4, Table 5, Table 6, and Table 7.

As expected, a significant positive relationship was found between CTA and CSA in Step 1 for each of the regressions. However, non-significant results were found for level of hockey, suggesting this variable was not related to CSA. In Step 2, no significant additional variance was found for any of the predictor variables (i.e., OCEAN) or for the moderator variable (i.e., early specialization). Similarly, in Step 3 no additional variance was accounted for by the interaction term for all predictor variables except agreeableness. In Step 3, the interaction of agreeableness and early specialization accounted for significant additional variance in CSA ($\Delta R^2 =$. 035, $p <$. 05).

In order to further probe the significant interaction, simple regression equations were calculated for each group (early specializer, sampler) for low (1 SD below mean) and high (1 SD above mean) levels of agreeableness. The method of plotting an interaction effect was provided by Aiken and West (1991) and Cohen and Cohen (1983). The resulting graph is presented in Figure 1. There is a crossover effect present, meaning that the level of CSA for high and low agreeableness was dependent on which group the participant belonged to. The steeper slope in the line representing samplers suggests that under low levels of agreeableness, samplers scored significantly higher on CSA than early specializers, but under high levels of agreeableness, samplers and early specializers have comparable CSA scores.

Discussion

This research was the first work to collectively examine anxiety and personality factors in relation to early specialization among youth. Specifically, it was the first to (a) examine potential differences in anxiety between early specializers and samplers, (b) examine potential differences in personality traits between early specializers and samplers, and (c) examine the moderating effect of early specialization on the relationship between personality and CSA. No significant differences were found for anxiety levels (i.e., CSA, CTA) or personality (i.e., OCEAN) between early specializers and samplers. Hierarchal regression analyses revealed CTA consistently predicted CSA, but only one personality trait – agreeableness - significantly predicted CSA. Additionally, an interaction between agreeableness and sport trajectory was found, whereby samplers with low agreeableness experienced greater levels of CSA than early specializers with low agreeableness, but there were no differences in CSA scores between samplers and early specializers when athletes had high agreeableness. While this study was exploratory in nature, we were somewhat surprised by findings showing minimal relationships between personality, sport trajectory, and anxiety.

Personality, Sport Trajectory, and Competitive Anxiety

Competitive Anxiety. A finding that is likely a true rejection of the null hypothesis, is the significant relationship found between CSA and CTA. As discussed previously, anxiety has two facets, state and trait, and these two facets are highly related (Hanton, Mellalieu & Hall, 2001). Essentially, this means that a more generally anxious one is (i.e., trait anxiety), the more they experience anxiety to a specific event (i.e., state anxiety). This same relationship in competitive anxiety would mean the more anxious one is about the threat of competition (i.e., competitive trait anxiety), the more anxious one will be about a specific competitive event (i.e., competitive

state anxiety). Because each facet (state and trait) manifests in similar symptoms, is it not surprising to find a significant relationship between CSA and CTA. This relationship is also supported in previous literature (Hanton, Mellalieu & Hall, 2001).

Personality and Sport Trajectory. Past research has shown relationships between personality traits (i.e., extraversion, conscientiousness, neuroticism) and sport outcomes (i.e., involvement, performance level; Allen et al., 2011; Eglof & Gruhn, 1995; Mckelvie, et al., 2003; Piedmont, et al., 1999). In this study however, no personality traits were found to predict sport trajectory (i.e., distinguish early specializers from samplers). One possible explanation is the young age of participants. Specifically, personality traits such as extroversion, conscientiousness, and neuroticism may manifest themselves differently in relation to training, practice, effort, and investment among older athletes than younger athletes, making differences in sport trajectory based on these traits, less prevalent. Further, given the young age of the participants, parents may have still been playing a primary role in selecting the child's sport activities, making children's personality a less important factor in their sport trajectory.

Personality and CSA. Previous research has also show relationships between personality (i.e., neuroticism) and anxiety (Kotov et al., 2010; Malouff et al., 2004). In this study, the only personality trait of the Big-Five model that was significantly associated with CSA was agreeableness, indicating that warm and understanding players had different levels of CSA compared to those who were low in agreeableness. This relationship has not been seen in previous research and warrants future investigation. A potential explanation for this finding can be found in the peer relations' literature, where agreeableness has been shown to be an important factor in peer relations in school settings. Specifically, low agreeableness has been associated with increased victimization by peers (Jensen-Campbell, Adams, Perry, Workman, Furdella, &

Egan, 2002). If this same pattern exists in sports settings (i.e., low agreeableness leads to victimization), children who are low in agreeableness may also feel more pressure to perform and potentially have higher levels of CSA. In other words, children low in agreeableness may feel pressure to play well, so that they are not victimized.

While this relationship between agreeableness and CSA is plausible, it is also possible that this significant result was caused by a type 1 error (i.e., false positive) – given non-significant findings of all other tests. If type 1 error were the explanation, findings would essentially suggest personality traits are not predictive of CSA, aligning with previous research that has not shown a connection between agreeableness and anxiety (Kotov, et al., 2010; Malouff, Thorstiensson & Schutte, 2004).

Despite the breadth of research showing neuroticism is associated with anxiety (Kotov et al., 2010; Malouff et al., 2004), there was no significant association between neuroticism and CSA in the present study. This could be because this type of anxiety (i.e., CSA) is not as affected by personality traits as more general anxiety disorders, but more research is needed to explore this concept.

Personality, Sport Trajectory, and CSA. It has been suggested that early specialization could lead to higher levels of competitive anxiety, given athletes invest more time and may feel greater pressure to succeed (Baker et al., 2009); however, findings did not directly support this suggestion. Insignificant results could be attributed to the team sport environment, given past work has shown team sport athletes generally experience lower levels of CSA than individual sport athletes (Flowers & Brown, 2002). Specifically, the team sport context of hockey may have served as a protective factor against athletes' CSA, regardless of whether they followed an early specialization or sampling trajectory.

CSA was only significantly different for early specializers compared to samplers in instances when participants were low in agreeableness, with the relationship found in the opposite direction than expected (i.e., samplers experienced higher levels of CSA than specializers). Again, these results have not been seen in previous research; however, some plausible explanations can be offered. Conceivably, because samplers play many different sports, they may not have adjusted as well as early specializers to the pressures and demands of playing hockey in Canada's intensively competitive and dominant sport culture (Canadian Heritage, 2010) - possibly resulting in higher CSA. Another explanation could be that children who choose to sample many different sports may feel additional pressure to perform well to justify their decision to be involved in other activities (i.e., not 'fully' committed to hockey), and this self-induced pressure may manifest as CSA.

Strengths, Limitations, and Future Directions

While this study was that the first to explore the relationship between early specialization, personality, and anxiety, the study was not without limitations, resulting in some key areas for future research. One aspect of the study that was somewhat challenging to navigate from the perspective of optimal protocol and practical logistics was the timing of data collection. Due to the length of the hockey season, data was collected during both the regular season and playoffs. Typically, playoff hockey can be more stressful – and potentially lead to higher CSA among players – given the threat of elimination in each game; however, this timing was also somewhat optimal, by potentially allowing for more variability in the outcome scores of CSA. In future research, a control question regarding importance of game may be a helpful addition to better understand players' context (i.e., amount of stress and pressure).

Another key challenge in this study surrounded the categorization of athletes as early

specializers or samplers. Specifically, parents often failed to follow instructions for the completion of the screening tool, providing too much or too little information (e.g., listing school sports when explicitly instructed not to do so), potentially leading to athletes' incorrect categorization (e.g., a child may have been grouped as a sampler when in fact they were an early specializer, or vice versa). However, the screening tool should also be recognized as a strength – in that it was a small advancement in the categorization of young athletes according to their sport trajectories, given only a few studies have been effective in doing this (e.g., McFadden, Bean, Fortier & Post, 2016; Strachan et al., 2009). The revised version of the DHAQ (Hopwood et al., 2010) was brief (i.e., 7-10 minutes for completion), built upon a recognized definition of early specialization within the literature (Baker et al., 2009), and provided clear criteria for the categorization of 77 young athletes. Future researchers should continue working to refine an effective categorization tool – specifically ensuring instructions are brief, simple, and clear, to enhance parents' readability and accurate completion.

A more general related challenge surrounds inconsistent definitions of early specialization within the literature. While most researchers agree that early specializers pursue primarily one sport from a young age, the "cut off" age for single primarily sport involvement varies depending on the sport and guiding sport participation model. For example, the DMSP (Côté, 1999; Côté & Hay, 2002; Côté & Fraser-Thomas, 2016) suggests early specialization occurs with extensive investment and competition prior to age 13, while the Long Term Athlete Development Model (Canadian Sport for Life, 2004) describes early specialization as the learning of complex skills before maturation occurs. Further, while certain definitions include the length of training (e.g., increased frequency and increased duration of training; Wiersma, 2000), others focus on time spent in activities (e.g., year round; Hill & Hansen, 1988). While Baker and colleagues' (2009)

definition which includes length of time spent in sport, type of training, age of first involvement and competitive nature, appeared most comprehensive to guide categorizations in this study, we were only able to objectively measure and classify participants according to differences in one of these four criteria (i.e., time spent in sport). In order for research in this area to progress, a consistent measurable definition of early specialization is needed.

An additional research consideration surrounding sport trajectories should be the emerging trend of children's high investment in multiple sports from an early age. While inherently an oxymoron according to current definitions of early specialization, this trajectory could perhaps be viewed as "diverse early specialization", making the binary division of early specializers and samplers more complex. Athletes who start more than one sport from a young age, but continue to invest and compete heavily in multiple sports throughout childhood – either simultaneously or in opposite but overlapping seasons - fall into a grey area that may warrant future investigation.

Preliminary Implications and Future Directions

This research was timely given the growing trend towards early specialization within youth sport programs, yet varied positive and negative outcomes associated with the early specialization trajectory (Fraser-Thomas et al., 2005; Law, et al., 2007; Strachan, et al., 2009). However, the current study did not show a clear link between early specialization and CSA, indicating that CSA may not be an outcome of concern when children and parents are making the decision to specialize early. Parents and their child athletes should therefore consider other positive outcomes such as diverse peer group interactions (Strachan et al., 2009) and negative outcomes such as risk of burnout or dropout (Fraser-Thomas et al., 2005) associated with early specialization when considering the path of early specialization for their child.

In terms of personality, more research is needed to better understand the five –factor model and its relationship to sport trajectory and CSA. This study showed the personality trait of agreeableness to be a factor to consider when examining CSA. Moreover, given the interaction between agreeableness and sport trajectory, this personality trait may be a factor to consider when deciding whether sampling or specializing may be a more optimal path for a young. Parents should at least be made aware of this potential relationship and advised to consider their child's personality (specifically, agreeableness) when making sporting decisions. Further, programmers and coaches may find such information helpful, to best advise, guide, or at a minimum, better understand young child athletes who may be following sampling or specializing sport trajectories.

While findings of this study did not yield strong or extensive relationships between personality, sport trajectory, and competitive anxiety, continued research would be beneficial to reach a more established answer as to "who" early specialization is best suited for. This study focused specifically on the sport of ice hockey. Future research should focus on different sports to determine if similar results are found across different sport contexts. In particular, a similar study should be conducted among individual sport athletes, given their CSA tends to be higher (Flowers & Brown, 2002). Additionally, future studies should include females to determine if and how the relationship between personality, sport trajectory, and competitive anxiety maybe be the same or different between sexes. This information could again help parents and programmers make the best sporting decisions for a particular child. The age range of participants in this study was exclusive (i.e., ages 11 and 12) and future research should examine both older and younger youth to better understand relationships between CSA and sport trajectory, as well as their personality traits throughout late childhood and adolescence, to determine if similarities or

differences exist across age groups. Finally, there is a need for longitudinal research, given that the majority of work looking at sport trajectory has been retrospective or cross sectional in nature, and thus failing to provide prospective insight into the long-term outcomes associated with a variety of sport trajectories.

As noted above, there may also be a trend towards young athletes engaging in a trajectory involvement in what is currently defined as early specialization (i.e., based on start age, time invested, competition, and intensity of training) - but in multiple sports. Further research is necessary to more clearly establish if such a trajectory exists, and potential outcomes associated with this path. In turn, there may be a need to re-examine and modify existing sport trajectory models to ensure they are more inclusive of diverse sport pathway, while also giving considerable attention to the question of "who" this new pathway may be best suited for (i.e., consideration of factors such as personality and competitive anxiety).

Continued research into personality, early specialization and competitive anxiety may cause parents and policy makers to become more aware of potential positive and negative consequences in young athletes and call for a change in the competitive structure of youth sport. For example, in select European countries children do not truly "compete" in hockey until they reach 14 years of age; prior to that age, children are not allowed to be cut from teams, focusing instead on fun and development in the younger age groups (Martel, 2015). Further research is needed to investigate the potential outcomes of this sport structure (i.e., whereby an entire sport system eliminates the trajectory of early specialization) and potential negative (and positive) outcomes associated with that may be eliminate as a result of a single trajectory option. Further, the effectiveness of such a system may also be context specific, meaning outcomes could play out differently in Canada's hockey obsessed culture (Canadian Heritage, 2010) than in European

nations.

Conclusion

While there are many physical and psychosocial outcomes associated with early specialization, CSA was not found to be a probable outcome in this particular sample. Early specializers did not experience significantly higher levels of CSA compared to those that sampled a variety of sports. Of the significant interaction between agreeableness and CSA, samplers experienced greater levels of CSA. Personality traits were also not correlated with early specialization, indicating that children do not choose to specialize based on their personality. Generally, personality traits were also not associated with CSA. While the study was exploratory in nature, findings were somewhat surprising given past associations between personality, sport, and anxiety in the literature. More research in different sport contexts would be beneficial to further advance understanding of potential relationships between personality, sport trajectory, and competitive anxiety; however, analyses of this study provide preliminary information about who early specialization may be best suited for, which can facilitate programmers', parents', and youths' decisions regarding children's sport pathway.

Table 1

Descriptive Statistics of Study Variables by Early Specializers and Samplers

	Early Specializers (n=43)			Samplers (n=34)		
	M	SD	%	M	SD	%
Demographic						
Ethnicity (Caucasian)			81.39			82.35
Number of Siblings	1.39	.63		1.47	.76	
Birth Year 2005			55.8			61.76
Birth Year 2004			44.2			38.24
Specialization						
Start age of hockey	5.32	1.40		5.33	1.49	
(A)			46.51			58.82
(AA)			32.56			26.47
(AAA)			20.93			14.71
Hours in hockey (2016/17)	8.93	2.84		8.84	2.82	
Hours in other sports (2016/17)	3.65	4.14		7.72	4.77	
Hours in hockey (2015/16)	9.03	3.12		8.59	2.56	
Hours in other sports (2015/16)	3.32	3.42		7.63	4.12	
Personality						
Openness	14.57	2.68		14.03	2.44	
Conscientiousness	13.11	3.62		12.46	2.78	
Extraversion	15.20	3.24		14.22	3.29	
Agreeableness	14.24	3.28		13.90	2.90	
Neuroticism	11.02	3.35		10.65	2.67	
Anxiety						
CSA	23.90	6.77		24.33	5.70	
Somatic	8.11	2.86		7.81	2.17	
Cognitive	8.09	2.84		7.97	2.52	
Confidence	7.60	2.50		8.71	3.59	
CTA	23.32	7.31		21.64	4.35	
Somatic	7.68	2.55		6.97	1.79	
Worry	9.15	3.95		8.24	2.41	
Concentration	6.81	1.99		6.42	1.37	

Note: All personality variables have a possible score from 5 to 20; CSA and CTA anxiety measures have a possible score of 15 to 60,

Table 2

Pearson Correlations for Predictor and Outcome Variables

	1	2	3	4	5	6	7
1.CSA							
2.Openness	**-.231***						
3.Conscientiousness	-.117	**.350****					
4.Extraversion	**-.247***	.143	.036				
5.Agreeableness	-.215	**.298****	**.223***	.249*			
6.Neuroticism	.099	-.126	-.151	-.036	-.217		
7.CTA	**.656****	-.111	**-.236***	**-.292****	-.115	.153	
8.Early Specializer	.038	.111	.117	.161	.015	.012	.095

* p<. 05, ** p<. 01

Table 3

Openness and Early Specialization Moderated Hierarchal Regression Analysis Predicting Competitive State Anxiety

		CSA
	ΔR^2	B
Covariates	.435**	
Level of hockey		-.114
CTA		.654**
Predictor	.030	
Openness		-.206
Early specializer		-.124
Interaction	.006	
Openness*Early Specialization		.125
TOTAL ΔR^2	.471	

*p<.05, **p<.01

Table 4

Conscientiousness and Early Specialization Moderated Hierarchal Regression Analysis Predicting Competitive State Anxiety

		CSA
	ΔR^2	B
Covariates	.425**	
Level of hockey		-.170
CTA		.691**
Predictor	.035	
Conscientiousness		.080
Early specializer		-.168
Interaction	.001	
Conscientiousness*Early Specialization		.045
TOTAL ΔR^2	.461	

*p<.05, **p<.01

Table 5

Extraversion and Early Specialization Moderated Hierarchal Regression Analysis Predicting Competitive State Anxiety

		CSA
	ΔR^2	B
Covariates	.425**	
Level of hockey		-.122
CTA		.643**
Predictor	.019	
Extraversion		-.055
Early specializer		-.122
Interaction	.000	
Extraversion*Early specialization		-.004
TOTAL ΔR^2	.444	

*p<.05, **p<.01

Table 6

Agreeableness and Early Specialization Moderated Hierarchal Regression Analysis Predicting Competitive State Anxiety

	CSA	
	ΔR^2	β
Covariates	.445**	
Level of hockey		-.075
CTA		.655**
Predictor	.035	
Agreeableness		**-.391***
Early specializer		-.118
Interaction	**.035***	
Agreeableness*Early specialization		.317
TOTAL ΔR^2	.515	

*p<.05, **p<.01

Table 7

Neuroticism and Early Specialization Moderated Hierarchal Regression Analysis Predicting Competitive State Anxiety

	CSA	
	ΔR^2	B
Covariates	.436**	
Level of hockey		-.103
CTA		.676**
Predictor	.016	
Neuroticism		-.160
Early specializer		-.136
Interaction	.016	
Neuroticism* Early specialization		.212
TOTAL ΔR^2	.468	

*p<.05, **p<.01

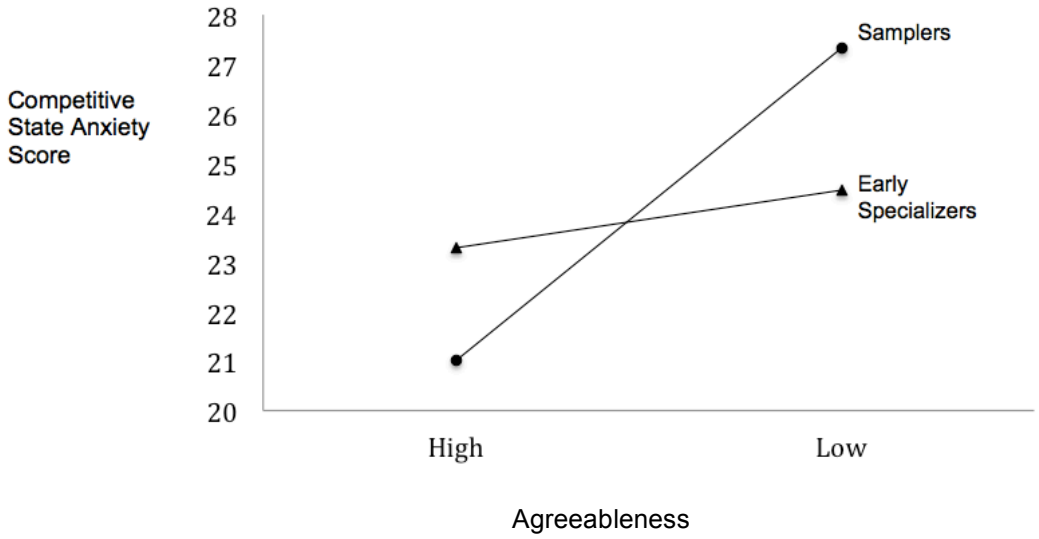

Figure 1. Interaction Indicating Early Specialization Regressed on CSA at values of High (SD above the mean) and Low (1 SD Below the Mean) Agreeableness.

General Discussion

In recent years, there has been growing interest in the positive and negative outcomes associated with early specialization (McFadden et al., 2016; Strachan et al., 2009), and it has been suggested that early specialization could lead to higher levels of competitive anxiety, given athletes invest more time and may feel greater pressure to succeed (Baker et al., 2009). Given past research showing associations between personality, sport outcomes, and anxiety, this study explored the relationship between personality, sport trajectory (i.e., early specialization or sampler) and anxiety among youth hockey players. Early specializers did not experience significantly higher levels of CSA compared to those that sampled a variety of sports. While early specializers and samplers did not differ significantly on personality traits or CSA, hierarchical regression analyses revealed that agreeableness predicted CSA. In particular, it was found that samplers had higher CSA than specializers when they were high on agreeableness. This study suggests that personality does not appear to be a key factor in determining "who" early specialization works for (e.g., who benefits, who does not, if it is necessary).

Providing Context: Why This Population

As this is the first study (to our knowledge) to explore the relationship between personality, sport trajectory, and competitive anxiety, substantive consideration was given to an appropriate sample for the study. The focus on the sport of ice hockey was driven by a number of factors, the first being the prevalence of youth hockey in Canada. According to Canadian Heritage (2010), 22% of Canadian children aged 5-14 play hockey, making it among the most popular (i.e., participated in) sports in Canada. The second consideration was more practical; the draft age for hockey players in Canada is 16 years of age, meaning hockey athletes are likely to specialize at a young age in order to obtain such an elite level by age 16 (i.e., according to

Ericsson et al., 1993). Given that the DMSP (Côté, 1999; Côté & Hay, 2002; Côté & Fraser-Thomas, 2016) suggests early specialization occurs before the age of approximately 13, it is likely that many hockey players would be early specializers.

Only males were selected for participation in the study given the structure of professional sport. Simply put, there is no professional hockey league for women that compares to the National Hockey League (NHL). While there are some elite level hockey opportunities for women such as the Olympics, the potential tangible rewards earned from playing hockey are arguably not comparable for men and women. For this reason, it could be assumed that males (and their parents) would choose to dedicate more time and resources to hockey than females (and their parents), and that males and their parents would be more likely to make this investment earlier (i.e., to specialize early) compared to females.

The Peewee age range (i.e., ages 11-12) was chosen for this particular study given that body checking is introduced into the sport of hockey in the subsequent age group (i.e., Bantam, ages 13-14). Body checking is body contact, which is often in a different direction than the puck carrier, for the purpose of stopping progress of the puck carrier (OMHA, 2017). The fear of being hit or injured could have had a confounding effect when examining competitive anxiety in hockey players (Fraser-Thomas, Jeffery-Tosoni, & Baker, 2014), and for this reason, the age level just before body checking was introduced was studied to ensure that athletes were experiencing competitive anxiety only in relation to playing hockey (versus in relation to body checking).

Limitations

Many limitations of the study have been discussed previously, however there are still limitations that warrant explanation. First, while the questionnaires utilized in the study were

validated in a younger population (i.e., ages 8-12) (Donnellan et al., 2006; Smith et al., 2006; Stadulis et al., 2002), young participants (particularly those in the 11 year old cohort) had issues with comprehension of some items in the questionnaires. When participant questions arose related to terminology, the researcher attempted to provide consistent explanations; however, it is acknowledged that the words chosen by the researcher to further explain a construct may have changed the meaning of the question to the children, in turn potentially changing their subsequent response. For example, when children asked for further explanation of the word "abstract ideas," the researcher may have given a different description to the word 'abstract' than the measure intended. However, because there were only a limited number of words that created confusion among participants (i.e., two words), with multiple items measuring each facet, these issues should not have affected the overall validity of the questionnaires.

Second, as stated previously, the screening tool to determine early specialization appeared to be too cumbersome for parents and resulted in the provision of sometimes unclear or incorrect information. While this may have effected the classification of some athletes as specializers or samplers, the researcher feels that due to the low number of unclear or incorrectly completed screening tools, it would not have significantly altered the end results. In the future, a shorter and clearer screening tool is recommended. Additionally, the issue of memory recall could have played an important factor in the classification of athletes. For example, if parents were to remember incorrectly and provide inaccurate data regarding their child's previous sport participation, this could have also altered the results. While the irregularity of hockey schedules coupled with the young age of the boys led us to request information from parents, past research has been successful in garnering practice and competition information from youth (e.g., Fraser-Thomas, Côté, & Deakin, 2008); further exploration of optimal age to begin asking youth this

information may also be warranted.

Lastly, due to the particular sample used, it is difficult to determine the generalizability of the findings. Not only was the study conducted with one sport and one age range; the majority of the teams were also from the same geographic area and belonged to the same provincial sport organization. Athletes in other areas or leagues may have different experiences than those studied, which may have led to different study findings Moreover, the sample comprised of youth of primarily Caucasian decent, meaning research performed on athletes of different ethnicities and cultures is warranted.

Future Directions

Given the limited generalizability of the current study's findings, future research should expand to include a different geographical area, more diverse ethnicities and cultures, and diverse ages. This will help to better understand if the pattern of relationships is universal or only seen in this particular population and context. In addition, as there are known differences in the personality and anxiety exhibited between males and females (Feingold, 1994), future research should examine a female sample. This would help researchers to not only compare results between sexes, but to determine if early specialization is better suited for one sex over another.

Sport Trajectory. As stated previously, researchers noticed based on the number of hours spent in each sport, that there appears to be a growing trend of athletes specializing early (i.e., investing heavily from a young age) - in multiple sports. Such a trajectory is not currently reflected in key sport participation models (Canadian Sport for Life, 2004; Côté & Fraser-Thomas, 2016). This trajectory is different from the sampling phase of the DMSP (Côté & Fraser-Thomas, 2016), because the goal is not fun and enjoyment, but rather, to be the best (or optimally perform) in every sport. Future research is needed to learn more about this apparent

emerging pathway.

As research continues into the potential positive and negative consequences of early specialization, youth sport programming and structures may see reform. With such reform, practical questions may arise – that require further investigation. Should sport organizing bodies (e.g., National Sport Organizations) regulate early specialization? What type of regulation and change of sport structure would be necessary? How would these changes affect children of low socio-economic status for whom time and practical resources are a barrier for sport participation? These questions and others are important and will continue to be pressing if participation trends continue as they have in recent years.

Competitive Anxiety. Other areas of further investigation emerging from this research might be to better understand the coach's influence within the personality-sport trajectory-anxiety relationship. Past work has suggested coaches can influence youths' competitive anxiety (Baker, Côté, & Hawes, 2000) thus another important area for study includes consideration of coaches' personality, and/or the dyadic relationship of coaches' and athletes' personalities on athlete anxiety. Further, this entire study was built upon the assumption that competitive anxiety is somewhat problematic to performance; however, some athletes have found CSA to be helpful for performance, allowing them to focus on the task at hand (Aoyagi et al., 2009). Furthermore, a meta-analysis found no real link between CSA and performance, concluding that high levels of CSA do not appear to be detrimental to athlete performance (Craft, Magyar, Becker, & Feltz, 2003). Regardless, CTA has been linked to burnout from sport, which is a concern (Aoyagi et al. 2009). As such, additional study of the relationship between CSA, CTA, and developmental outcomes of each (e.g., long term participation, enjoyment, etc.) may be warranted. How can children cope with and prevent high levels of CSA in competitive situations? Is there a point

where the child should no longer be participating in a sport if their CTA and/or CSA levels are too high? These types of questions will be important to answer, as parents, coaches, and programmers are made more aware of competitive anxiety in children.

Personality. Personality in sport is an area of research that needs further exploration in younger populations. As stated previously, most studies of personality in sport have focused on adult athletes. It would be useful for parents and children if researchers examined how personality traits may be associated with children's sport experiences and outcomes. Questions such as are children high in extroversion better suited for team sports or are children with high neuroticism more likely to drop out of sport, would be important information to provide to parents. Additionally, researchers may now want to examine other factors related to an individual that may help answer this question. For example, future research should look at the parent-athlete relationship to determine if a certain dyad (i.e., combination of parent-child personalities) is better suited to benefit from early specialization. Parent personality traits could also provide further insight into who exactly can benefit the most from early specialization and who should avoid this pathway.

Personality research is beneficial on the most basic level of human nature; - better understanding ones self; however, it has also been shown to be important in mental health research by linking personality trait with predispositions to mental health issues (Malouff, Thorstiensson & Schutte, 2004). From a sport perspective, research into personality has shown promising results at predicting long-term performance outcomes (Gee, Marshal & King, 2010; Aidman, 2007), which is helpful information for coaches and parents alike. On a more personal level, if coaches are better able to understand their players by building personality profiles, this could help coaches to better develop, cooperate with and connect with individual players.

Conclusion

The results of this thesis offer insight into the effect personality and early specialization can have on CSA. This study and future studies will provide key information for parents and policy makers to consider in regards to the path of early specialization for children. This analysis found no conclusive evidence that personality and/or early specialization are factors of importance when examining CSA. However, this study was an important first step in establishing "who" early specialization is best suited for.

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